

ABSTRACT

In one embodiment, a solder preform includes a solder matrix having microparticles secured with the solder matrix. The microparticles are constructed so as to be capable of arranging during a solder bonding process so as to provide a uniform separation between opposing soldered surfaces. The microparticles may be shaped to inhibit stacking of the microparticles while self arranging during the solder bonding. The solder preform may have an amount of microparticles with respect to the solder matrix to inhibit stacking of the microparticles during the solder bonding process. Microparticles may be spheres, powders, polyhedrons, crystalline particles, nanostructures, or the like, which may be capable of conducting electric current, or may be dielectric material; for example glass, plastic, metal, or semiconductor material. In one implementation microparticle loaded solder preform may be fabricated by selecting microparticles capable of self arranging within a solder alloy so as to provide a uniform separation between opposing solder surfaces during a solder bonding process, combining the microparticles with the solder alloy, and forming a solder preform having a solder matrix with the microparticles embedded therein. This may include mixing the microparticles and solder alloy by shaking, folding, stirring, pressing, or rolling. Some implementations, may include tailoring a coefficient of expansion of the solder preform by selecting and combining appropriate microparticles with the solder alloy.